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The role of the actuary in responsible Artificial Intelligence

Artificial Intelligence (AI) is radically changing the environment we currently live in and presents a unique and powerful solution in meeting many of the challenges facing the financial industry today. AI broadly refers to using data and algorithms to detect patterns and predict future events and behaviors. There are various use-cases for the application of AI in the insurance industry: ranging from automating and personalizing customer-facing activities to predictive modelling and fraud detection.

Compared to other industries surveyed in Deloitte's State of the Enterprise survey[1], the financial services industry was found to be lagging in the adoption of AI. This could be due to the most prominent challenge identified by the global survey: the management of AI-related risks – including the transparency of AI decisions, data security and data privacy or consent mismanagement. Particularly in the application of AI in insurance, it is imperative that AI models are used ethically and are free of bias. Consider the regulatory requirement to exclude certain variables when for example pricing insurance products (such as gender, age and ethnicity). Such variables are known as protected attributes. However, the inclusion of certain proxy variables, such as postal code or whether the policyholder watches *Top Gear*, could unintentionally lead to implicit discrimination due to their associations. AI models have the capacity to learn and generate complex algorithms for the purpose of optimization – ultimately making the correlations of such proxy variables difficult to detect and analyze, giving AI the nickname of a "Black Box". Therefore, it is imperative to fully understand the additional risks that AI modelling imposes and develop a strong mitigation strategy when incorporating AI into actuarial models.

In this article we further explore how applications of AI can change the insurance industry and the ethical implications thereof. Although we probably don't need to worry about AI developing 'consciousness' and taking over the world any time soon (like we see in Sci-Fi movies), we still need to exercise some degree of caution when it comes to the new risks that such innovative technology introduces and ensure that these risks are effectively mitigated.

USE CASES OF AI FOR INSURANCE
There is a wide range of use cases for the applicability of AI in the insurance industry, some of which have already been incorporated into the business models of InsurTech companies with the aim to improve accuracy, efficiency and cost effectiveness. We believe that some of the most relevant include:

1. **Customer support, personalization and claims processing**:
The incorporation of chatbots to facilitate and automate various customer service activities can offer an improved customer experience in an efficient, yet still personalized, manner. AI chatbots may have the ability to assist policyholders with answering questions and filing claims. AI can also be used for the automation of claims-processing in an efficient and cost-effective manner. Moreover, AI may aid the tailoring of insurance products and services according to the unique preferences and needs of the individual policyholder.

2. **Underwriting and policyholder risk assessment:**
The underwriting process may be improved using AI to evaluate policyholder data and identify risk factors to efficiently, and accurately and optimally price insurance products according to the risk profile of the policyholder.

3. **Predictive modelling and data analysis:**
AI can assist the forecasting of pricing, lapses and claims when incorporated into predictive models.

4. **Fraud detection:**
AI has the capability of identifying potentially fraudulent activity through algorithms that assess various data sources and behavioral patterns which are indicative for fraud.

5. **Health monitoring and incentivization:**
AI algorithms can track and analyze health data to identify potential health risks and can further be used to encourage healthy behaviors and decision-making of policyholders through rewards and gamification.

6. **Providing novel insights for decision-making:**
AI could even offer a unique solution in the migration to the *Wet toekomst pensioenen* (Wtp) in the Netherlands[2]. Due to the multiple stakeholders involved and the various interacting and multi-dimensional choices facing pension funds in the transfer to the NPD, decision-making is highly complex and difficult to assess with only a trial-and-error approach or other traditional methods. Where humans have difficulty with evaluating a large number of variables at once, AI offers a powerful solution for solving complex and multi-dimensional problems through optimization according to the objectives of the particular pension fund to provide novel and improved insights.

AI shows promising and innovative potential for several use-cases in the insurance industry, but this potential also brings new unique challenges.

THE IMPLICATIONS OF ETHICS AND FAIRNESS IN AI FOR INSURERS
AI models require a large amount of data and it is imperative that this data is secure, of high quality and free from bias. Regulatory requirements impose the restriction of certain protected variables such as age, ethnicity and gender. However, the incorporation of certain alternative variables may act as proxies for the restricted variables and may unintentionally lead to indirect discrimination in the given model. Since AI algorithms excel at processing multiple interrelated variables and are highly complex, AI algorithms have the capacity to further perpetuate such bias leading to unfair outcomes for protected groups and this bias could be difficult to detect. Moreover, the intricacies associated with AI algorithms make it difficult to understand, this generates additional difficulty in identifying and analyzing the correlations of proxy variables. Due to this lack of transparency and high complexity, AI is sometimes referred to as a "black box".

AI has the potential to derive highly individualized insurance pricing, however, this comes at the expense of solidarity and the benefits of risk pooling. The DNB has warned that solidarity in the insurance industry can be compromised if AI gives insurers the ability to price risks almost precisely per individual policyholder. This could ultimately lead to insurance becoming inaccessible for some individuals. The algorithms, systems and data handling of insurers are also subject to regulation and further European regulations are currently being drafted by EIOPA[3].

From left to right:

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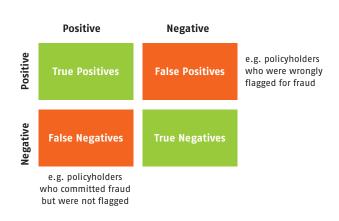All work in the Actuarial and Insurance Solutions team at Deloitte NL.

Similar to the context of solidarity for insurance pricing, using AI algorithms to promote and reward healthy decision-making may also present new ethical considerations. Think of rewarding policyholders based on their daily step count: should it be taken into consideration that it is generally more difficult for a high-BMI individual to walk 10,000 steps than a low-BMI individual? If statistics suggest that males are generally more active than females, is it fair to set both groups the same step target in the reward point system?

Furthermore, the mismanagement of the risks associated with AI may have legal and reputational consequences for insurers. Therefore it is imperative that insurers incorporate ethical safeguards to manage the risks associated with AI. A framework to ensure governance and regulatory compliance throughout the AI lifecycle includes the following domains[4]:

1. **Fair and impartial:**
   This includes assessing whether AI systems include internal and external checks to enable fair application across all policyholders. A potential method to test whether a model produces unfair results for individuals or demographic groups includes the assessment of model errors. The errors (i.e. false positives and false negatives) produced by the model may be analyzed to identify whether certain variables have a fair probability of producing a false positive or a false negative, should this data be available. Consider, for example, a fraud detection model: the likelihood of falsely being flagged for fraud should be equal across demographics.

	Positive	Negative	
Positive	True Positives	False Positives	e.g. policyholders who were wrongly flagged for fraud
Negative	False Negatives	True Negatives	

e.g. policyholders who committed fraud but were not flagged

2. **Transparent and explainable:**
   Policyholders should have a good understanding of how their data is used and how AI algorithms make decisions. Algorithms, attributes and correlations should be open to inspection.

3. **Responsible and accountable:**
   Organizational structures and policies should be in place to clearly allocate responsibility for the output of AI system decisions.

4. **Robust and reliable:**
   Confirm that AI systems produce consistent and reliable outputs.

5. **Respectful of privacy:**
   Ensure that data privacy is respected and that AI does not leverage policyholder data beyond its intended state of use.

6. **Safe and secure:**
   Ensure that AI systems are protected from potential risks, including cyber risks, that may cause physical and digital harm.

CONCLUSION

Actuaries are held to high professional and moral standards due to their responsibility of managing the risks of financial securities for individuals in society. Moreover, insurers play a social role in society by the pooling and sharing of risks between individuals, making it important to ensure that insurance products remain accessible and affordable to all members of society. Insurers may also now have the ability to incentivize 'good' behaviors in their policyholders, but even these well-intended innovative measures may introduce certain ethical considerations.

While AI has the potential to, and to some degree already has, become a powerful and innovative tool for the actuarial profession and further transform the current insurance landscape, it is highly important that AI models are well understood and that high ethical standards are upheld. Furthermore, should such AI models be adopted then actuaries will have the role of facing various fundamental ethical decisions and further the responsibility of understanding and explaining AI models and managing and mitigating AI-related risks. It prompts us to rethink our work patterns such as review processes and also requires us to stay abreast of the ever-evolving fairness challenges. ■

1 – https://www2.deloitte.com/content/dam/Deloitte/us/Documents/deloitte-analytics/us-ai-institute-state-of-ai-fifth-edition.pdf

2 – https://www.iexprofs.nl/Column/737967/kunstmatige-intelligentie/In-het-nieuwe-pensioencontract-biedt-Artificial-Intelligence-uitkomst.aspx

3 – https://www.agconnect.nl/artikel/ai-creeert-risico-verzekeringsmarkt-waarschuwt-dnb

4 – https://www2.deloitte.com/us/en/pages/deloitte-analytics/solutions/ethics-of-ai-framework.html

DE ACTUARIS JUNI

JUNI 2023: DIGITAL

De wereld wordt steeds digitaler, en dat heeft veel positieve kanten. Een verzekering is in een paar muisklikken afgesloten, schades worden nu sneller afgehandeld, en in tijden van corona hebben we thuis gewoon kunnen doorwerken. Uiteraard zijn er ook nadelen van de toenemende digitalisering. Slimme algoritmes hebben het risico discriminerende resultaten te produceren, en cyber criminaliteit wordt een steeds groter probleem. In deze editie kijken we naar de verschillende manieren waarop de digitale samenleving ons allen raakt.

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